Individual Health Status and Racial Minority Concentration in US States and Counties

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Objectives. We examined whether the positive association between mortality rates and racial minority concentration documented in ecological studies would be found for health status after control for race/ethnicity, socioeconomic status, and region of residence.

Methods. We estimated least squares and probit models using aggregate and individual health status data from the 1995, 1997, and 1999 versions of the Current Population Survey merged with data from the US Bureau of the Census regarding state- and county-level racial minority concentration.

Results. Except in the case of older Whites, racial minority concentration was not associated with health status after control for individual characteristics and fixed regional factors.

Conclusions. Racial minority concentration may not be a determinant of individual health; differential migration patterns may explain the anomalous result for older Whites. (*Am J Public Health.* 2004;94:1043–1048)

Persistent racial disadvantages in all-cause mortality have been documented among African Americans of both genders and various age groups[1–4] and are mirrored in cause-specific mortality rates associated with numerous conditions such as cardiovascular disease and cancer.[2,5–7] Consistent with these patterns, several recent ecological analyses have reported that mortality rates are significantly greater in US states,[8–10] metropolitan areas,[10–12] counties,[13] and zip codes[14] in which Blacks represent a higher proportion of the population. Many of the significant associations found between the proportion of the population that is Black and mortality rates have stemmed from multivariate analyses controlling for differences in socioeconomic status[8–14] (mean income, income inequality, poverty, and level of educational attainment), behavioral risk factors[12] (cigarette consumption and obesity), and environment (urban concentration,[9] environmental pollution,[12] or region of residence within the United States[10,12]).

The frequent finding that mortality is significantly associated with racial minority concentration is intriguing for several reasons. Existing studies have not identified the mechanisms through which racial minority concentration affects mortality. In states, counties, or metropolitan areas, the proportion of the population that is Black ("proportion Black") may be a marker for another explanatory variable omitted from multivariate analyses of mortality rates, such as access to or quality of health care. Alternatively, proportion Black may represent the degree of racial discrimination; many studies have shown that one frequently studied measure of discrimination, residential segregation, has adverse consequences for mortality.[15–23] However, proportion Black is calculated in a different manner than segregation measures such as the dissimilarity index, which measures race distributions across smaller subunits within a given area. As a result, the correlation coefficients between the 2 measures have been small or low in previous studies (0.062[23] and 0.28[11]).

Further investigation of the association between racial minority concentration and health outcomes is also warranted given the frequent use of ecological analyses. It has long been known that relationships shown in ecological studies may not reflect associations at the individual level.[24] Consequently, multilevel analysis is often the preferred method of assessing the impact of ecological variables on the health of individuals, since it also adjusts for the effect of relevant individual-level traits such as race and socioeconomic status.[25,26] Several existing studies examining associations between area-level racial minority concentration and individual health status or health risks have produced mixed findings.[23,27–32] Furthermore, ecological studies of racial minority concentration and health status usually focus on large geographic units such as states or counties, while most multilevel analyses in this area have examined smaller geographic units, such as census tracts (the exception is a study examining proportion Black in metropolitan areas[23]).

The primary purpose of the current study was to assess whether associations between health outcomes and racial minority concentration in states and counties would persist after we controlled for individual-level factors such as race and socioeconomic status and the contribution of regional effects. We conducted multilevel analyses of separate samples of White and Black individuals using data on overall health status. Since the use of this outcome measure set our study apart from previous studies, we checked whether our data, when aggregated to the county and state levels, would yield significant associations between higher racial minority concentrations and worse health outcomes, as found in previous ecological studies focusing on mortality.

METHODS

We derived the data for our analysis from several versions of the Current Population Survey (CPS), a large nationally representative sample of the US population. The primary variable of interest, individual health status, was constructed from a measure of overall health status (1 = *excellent*, 2 = *very good*, 3 = *good*, 4 = *fair*, 5 = *poor*) reported for all individuals in each household by the head of the household. Using other survey responses, we constructed measures of annual per capita household income and individual age, race, educational level, marital status, health insurance coverage, and residence within a metropolitan or central city area (all variables were self-reported).

Following several other studies on social determinants of individual health, we selected White and Black respondents between the ages of 25 and 74 years who did not reside in group quarters.[33–35] In our analysis of the effects of state racial minority concentration, we used a sample of pooled respondents from the 1995, 1997, and 1999 versions of the CPS. The intervening years 1996 and 1998 were excluded to avoid double counting (since nearly 50% of respondents in each of these years were also surveyed in the previous year). After observations involving missing data had been excluded, our sample consisted of 185 889 individuals. These observations were merged, via the state of residence identifiers included in the CPS, with data on state racial minority concentration from the previous year. The proportion Black measure was constructed with state-level data from the Population Estimates Program of the US Bureau of the Census.

To construct the sample used in the analysis of racial minority concentration in county populations, we made 2 adjustments to the procedures just described. First, we excluded 1995 survey respondents because county identifiers were unavailable for that year. Second, we excluded respondents residing in most smaller US counties, for which the survey did not provide county identifiers. These steps yielded a sample of 58 451 individuals in 217 large US counties. Information on this sample was merged with county measures of proportion Black, again constructed from data obtained from the Census Bureau's Population Estimates Program.

To examine whether our use of overall health status would yield findings similar to those reported in previous ecological studies of proportion Black and population mortality, we used the CPS data to calculate the proportions of the population in poor or fair health for the 50 US states during 1995 to 1999 (n=250) and for 217 US counties during 1996 to 1999 (n=868). These measures were used as dependent variables in state and county regression analyses focusing on proportion Black and mean area income. The *t* statistics were calculated through the use of heteroskedasticity-consistent standard errors.

To test the association between racial minority concentration and individual health, we conducted multivariate analyses of individual health status (H). The dependent variable was an indicator variable with a value of 1 if health status was reported as fair or poor and a value of 0 otherwise. Because of the dichotomous nature of the dependent variable, we used a probit specification for our model. This model can be represented as

$$(1)\ \text{Prob}(H_{ist}=1) = \Phi(X_{ist}\beta_1 + A_{st}\beta_2 + \nu_t),$$

where *i*, *s*, and *t* refer to individuals, states (or counties), and survey year and $\Phi(X_{ist}\beta_1 + A_{st}\beta_2 + \nu_t)$ is the evaluation of the standard normal cumulative distribution function. The vector *X* comprises individual characteristics including annual household income per capita, age, and indicator variables for Black race, Hispanic ethnicity, gender, marital status (married or divorced/separated/widowed vs never married), educational level (less than high school, some college, or college or more vs high school), and health insurance coverage (any coverage vs no coverage).

In the state analysis, we also included controls for residence within a metropolitan area or central city. In our base model, the vector *A* comprises area-level measures of proportion Black of the state or county population and mean household income in the state or county. Finally, ν_t refers to time effects estimated with year dummy variables.

In some of our specifications, we included indicators for geographic region in the vector *A*. There is compelling evidence of significant region-specific variations in health status and use of health care services, thought to reflect regional differences in behavioral risk factors, availability of health services, and health care quality and price.[36,37] However, since only a subset of previous studies of the health effects of racial minority concentration have incorporated such controls,[10,12] we report results with and without the indicator variables for region. Region of residence was categorized as follows: New England, Mid-Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, or Pacific.

We estimated models separately for Whites and Blacks, allowing the effects of all explanatory variables to differ across race. We also compared these results with those obtained with separate subsamples of individuals aged 25 to 64 years or 65 to 74 years. So that our probit coefficients would be comparable to the ordinary least squares slope estimates reported in ecological studies, we calculated the "marginal effect" of a 1-unit change in each of the explanatory variables. Mathematically, for a continuous explanatory variable, the marginal effect is expressed as $\delta\text{Prob}(H_i=1)/\delta X_i = \beta\phi(X_{ist}\beta_1 + A_{st}\beta_2 + \nu_t)$, where β is the probit coefficient for variable *X* and $\phi(\ldots)$ is the standard normal probability density function evaluated at the mean for all continuous explanatory variables. We calculated discrete changes in the probability of fair or poor health as the dichotomous indicator changed from 0 to 1.[38]

Finally, since our model comprised variables at the level of both the individual and area of residence, we conducted a modified contextual analysis that allowed for the possibility that the residuals for individual observations in the same groups (counties or states) were correlated. That is, we calculated *t* statistics using standard errors corrected for observation clustering at the state–year (or county–year) level. As a result, our model was similar to a multilevel analysis employing random slope coefficients.[26]

RESULTS

Table 1 presents results from least squares models of the proportion of state or county residents in fair or poor health, regressed on proportion Black in the area. Despite our use of a different measure of health, we found results consistent with those of earlier studies: proportion Black, at both the state and county levels, had a significant positive association with the percentage of individuals reporting fair or poor health. The effect of proportion Black on area health status was robust to the inclusion of mean area income and year indicator variables. Having established that an ecological analysis of health status could yield results similar to those of previous ecological studies of mortality, we then explored whether these findings persisted when we used individual-level health status data.

Table 2 presents descriptive statistics for all individual and area variables in our subsequent analysis. There were significant differences in all variable means across race. In the state sample, 22.2% of Blacks reported fair or poor health, as compared with only 13% of Whites ($P<.01$). This difference was slightly smaller in the county sample: 19.1% of Blacks

TABLE 1—Descriptive Statistics and Results From Least Squares Models of Proportion of Population Reporting Fair or Poor Health Status: United States, 1995–1999, and 217 US Counties, 1996–1999

Explanatory Variable	Mean (SD)	Unstandardized Regression Coefficient (Absolute Value of *t*)
State-level ecological analysis (n = 250)		
Proportion Black: state population	0.101 (0.094)	0.202* (12.40)
State annual household income, thousands of $	43.26 (6.34)	–0.003* (10.14)
R^2	0.545	
Mean, y	0.138	
County-level ecological analysis (n = 868)		
Proportion Black: county population	0.116 (0.118)	0.093* (5.19)
County annual household income, thousands of $	47.99 (14.05)	–0.002* (10.90)
R^2	0.202	
Mean, y	0.132	

Note. Models also included indicator variables for year of survey.
*$P < .01$.

TABLE 2—Individual- and Area-Level Characteristics, by Race and Area of Aggregation: Current Population Survey Respondents Aged 25 to 74 Years

	State-Level Sample		County-Level Sample	
	Whites (n = 167 853)	Blacks (n = 18 028)	Whites (n = 51 327)	Blacks (n = 7120)
Mean proportion of population in poor or fair health (SD)	0.130 (0.34)	0.222*** (0.42)	0.120 (0.33)	0.191*** (0.39)
Mean age, y (SD)	45.52 (13.37)	43.4*** (12.81)	45.43 (13.30)	43.25*** (12.64)
Mean annual household income per capita, thousands of $ (SD)	21.40 (21.05)	14.24*** (14.79)	23.90 (25.18)	15.80*** (16.16)
Hispanic, %	11.1	2.2***	17.5	4.2***
Female, %	50.8	55.3***	50.9	54.9***
Married, %	68.3	41.6***	65.3	41.2***
Divorced, separated, or widowed, %	17.9	27.7***	18.7	27.0***
Any health insurance coverage, %	85.6	77.8***	84.3	77.3***
Less than high school education, %	14.8	22.6***	14.4	19.4***
Some college education, %	25.4	26.1*	25.9	27.6**
College degree or higher, %	26.1	14.5***	29.5	18.0***
Residence in metropolitan area, %	74.9	84.6***	. . .	. . .
Residence within central city, %	23.2	54.1***	. . .	. . .
Mean proportion Black in area (SD)	0.120 (0.07)	0.172*** (0.08)	0.117 (0.10)	0.260*** (0.16)
Mean state or county household income, thousands of $ (SD)	44.493 (5.40)	44.157*** (5.72)	50.288 (12.94)	46.831*** (11.61)

Note. Descriptive statistics were calculated through application of the supplemental weight provided in the Current Population Survey to individual observations.
*$P \leq .10$; **$P \leq .05$; ***$P \leq .01$.

versus 12% of Whites ($P < .01$). Our subsequent analysis examined the extent to which these differences in health status were attributable to other individual traits and area characteristics (e.g., racial minority concentration).

Table 3 summarizes results from probit models that examined, for each sample, the association between state-level racial minority concentration and individual health status. Absent controls for regional influences, proportion Black was significantly and positively associated with fair or poor health among Whites but was not significantly associated with health status among Blacks. However, once regional controls were included, the association between proportion Black and health status was not significant in either the White or Black sample. In the case of both samples, we were able to reject the null hypothesis that the effects of the region controls were jointly equal to zero.

Each cell in Table 3 represents the estimated marginal effect, all else equal, of a 1-unit change in a given explanatory variable on mean probability of fair or poor health. A 1-unit change in proportion Black is equivalent a change from 0% to 100% Black, so it is more meaningful to consider the effect of a half-unit change (i.e., a 50-percentage-point increase in percentage Black). In the base model for the White sample, our results show that an increase in proportion Black from the mean of 0.12 to 0.62 was associated with a 5.55-percentage-point ($[0.111/2] \times 100$) increase in the probability of fair or poor health. When region fixed effects were added, the same increase in proportion Black was associated with a (statistically insignificant) 0.8-percentage-point ($[0.016/2] \times 100$) decrease in the probability of fair or poor health. In the Black sample, an increase in proportion Black from 0.17 to 0.67 was associated with a 2.9-percentage-point decline in the likelihood of fair/poor health in the base model ($0.058/2 \times 100$) and a 1.1-percentage-point decline in the full model ($0.022/2 \times 100$). However, neither effect was statistically significant.

Table 4 summarizes results from probit models using county-level measures of racial minority concentration as determinants of individual health status. Absent controls for region, proportion Black was significantly and positively associated with fair or poor health among Whites and only marginally significant for (and negatively associated with) poor health status among Blacks. After the addition of controls for region effects, proportion Black had no significant association with health status among Blacks, and the effect among Whites was, at best, only marginally significant. Specifically, an increase in proportion Black from 0.12 to 0.62 was associated with 1.7-percentage-point increase ($P < .12$) in the probability of fair or poor health among Whites.

We also estimated the full model using separate samples of individuals aged 25 to 64 years and individuals aged 65 to 74 years (data not shown but available on request).

TABLE 3—Estimated Effects of Individual- and State-Level Characteristics on the Probability of Fair or Poor Health Status, by Race: Current Population Survey Respondents Aged 25 to 74 Years

	White Sample		Black Sample	
Explanatory Variable	Base Model	Base Model + Region Fixed Effects	Base Model	Base Model + Region Fixed Effects
Age	0.005*** (63.08)	0.005*** (63.43)	0.009*** (31.12)	0.009*** (31.24)
Household income per capita	–0.002*** (18.75)	–0.002*** (18.65)	–0.006*** (11.82)	–0.006*** (11.82)
Hispanic	0.003 (1.02)	0.002 (0.60)	–0.020 (0.91)	–0.011 (0.54)
Female	0.003* (1.92)	0.003* (1.91)	0.011 (1.59)	–0.010 (1.48)
Married	–0.055*** (17.68)	–0.056*** (17.80)	–0.080*** (7.69)	–0.078*** (7.55)
Divorced, separated, or widowed	–0.011*** (3.71)	–0.012*** (4.06)	–0.012 (1.19)	–0.012 (1.22)
Any health insurance coverage	0.002 (0.78)	0.003 (1.06)	0.037*** (3.97)	0.038*** (4.09)
Less than high school education	0.080*** (22.32)	0.078*** (22.57)	0.102*** (11.95)	0.104*** (12.13)
Some college education	–0.019*** (9.86)	–0.019*** (9.96)	–0.030*** (3.55)	–0.033*** (4.11)
College degree or higher	–0.048*** (21.01)	–0.048*** (20.88)	–0.052*** (4.52)	–0.055*** (4.87)
Residence in metropolitan area	–0.014*** (4.24)	–0.015*** (4.55)	–0.067*** (4.94)	–0.065*** (5.10)
Residence in central city	0.013*** (4.43)	0.014*** (4.29)	0.034*** (2.81)	0.033*** (3.03)
Proportion Black in state	0.111*** (6.30)	–0.016 (0.62)	–0.058 (0.97)	–0.022 (0.35)
Mean state income	–0.001*** (3.07)	–0.0004 (1.14)	–0.002** (2.43)	–0.001 (0.35)
χ^2 test of joint significance of region effects (*P*)		75.94 (<.00001)		48.55 (<.00001)

Note. Values reported are results derived from the following multivariate probit model equation (see text): *d*Prob(*Y*)/*dX* (absolute values of *t* are in parentheses). Both model specifications also included indicator variables for year of interview.
*$P<.10$; **$P<.05$; ***$P<.01$.

TABLE 4—Estimated Effects of Individual- and County-Level Characteristics on Probability of Fair or Poor Health Status, by Race: Current Population Survey Respondents Aged 25 to 74 Years

	White Sample		Black Sample	
Explanatory Variable	Base Model	Base Model + Region Fixed Effects	Base Model	Base Model + Region Fixed Effects
Age	0.005*** (38.15)	0.005*** (38.44)	0.008*** (18.68)	0.007*** (18.61)
Household income per capita	–0.002*** (10.17)	–0.002*** (10.17)	–0.005*** (7.99)	–0.005*** (7.90)
Hispanic	0.011** (2.18)	0.011** (2.23)	0.010 (0.41)	–0.0004 (0.02)
Female	0.003 (1.21)	0.003 (1.14)	–0.014 (1.41)	–0.013 (1.44)
Married	–0.054*** (11.56)	–0.054*** (11.67)	–0.082*** (5.79)	–0.077*** (5.65)
Divorced, separated, or widowed	–0.012** (2.43)	–0.012** (2.42)	–0.010 (0.80)	–0.005 (0.41)
Any health insurance coverage	0.007 (1.56)	0.007 (1.55)	0.042*** (3.91)	0.041*** (3.93)
Less than high school education	0.062*** (13.14)	0.062*** (13.40)	0.071*** (5.34)	0.072*** (5.48)
Some college education	–0.016*** (4.19)	–0.015*** (3.98)	–0.035*** (3.25)	–0.039*** (3.58)
College degree or higher	–0.042*** (12.33)	–0.042*** (12.32)	–0.074*** (5.04)	–0.078*** (5.45)
Proportion Black in county	0.047** (2.24)	0.034 (1.58)	–0.049* (1.91)	0.029 (0.96)
Mean county income	–0.0004*** (2.45)	–0.0004** (2.50)	0.0008 (1.62)	0.001*** (2.81)
χ^2 test of joint significance of region effects (*P*)		10.05 (.26)		35.86 (<.00001)

Note. Values reported are results derived from the following multivariate probit model equation (see text): *d*Prob(*Y*)/*dX* (absolute values of *t* are in parentheses). Both model specifications also included indicator variables for year of interview.
*$P<.10$; **$P<.05$; ***$P<.01$.

Only among Whites aged 65 to 74 years did we find a significant and positive association between proportion Black in the county and health status ($P<.01$). This effect was not observed when racial concentration was measured at the state level, and it was not observed among older Blacks at either the state or county level.

DISCUSSION

Previous ecological studies have reported significant positive associations between racial mi-

nority concentration and mortality rates in states, counties, and metropolitan areas. Several multilevel studies have examined associations between individual health and racial minority concentration within smaller geographic areas (i.e., census tracts as opposed to states or counties), with mixed results. Two studies reported significant positive associations between proportion Black and adults' mortality risk[28] and women's heart disease mortality[29]; however, when the association with heart disease mortality was adjusted for neighborhood household composition, it did not remain significant. One study revealed a significant positive association between proportion Black and incidence of low birthweight,[23] while, in contrast, a study of Chicago neighborhoods reported a significant negative association between proportion Black and infant mortality.[27]

In the present study, we conducted a multilevel analysis focusing on the role of racial minority concentration in geographically larger areas, such as states and counties, in an attempt to provide new evidence on the relationship between minority concentration and individual health status (an outcome not examined in previous multilevel studies). In addition, we controlled for the importance of fixed underlying regional differences (such as behavioral risks, availability of health care, cultural norms in diet and exercise) in determinations of individual health. With one exception,[23] previous multilevel studies on racial minority concentration and health have not accounted for these regional influences.

We first demonstrated that an ecological analysis of health status yielded results consistent with those observed in ecological studies of mortality. In our multilevel analysis, we found that, absent controls for regional influences, racial minority concentration at the state level was significantly associated with health status among Whites but not Blacks. However, once we controlled for regional effects, racial minority concentration was not significantly associated with health status in either sample. We observed a similar pattern in terms of racial minority concentration at the county level.

While most of our results showed that the effect of proportion Black was not significant once individual and regional controls were included, one important exception was found for older Whites. In this sample, county-level proportion Black had a significant positive association with poor health status. Previous ecological studies have suggested that adverse health consequences associated with high racial minority concentrations may be driven by the correlation with reduced availability of publicly provided services, higher levels of stress and crime, increased presence of environmental and behavioral risks, and increased social inequality and economic deprivation. While an attempt to adjust for all such factors was beyond the focus of the present study, our models did adjust for differences in mean area income.

Fuchs et al.,[12] in a study of mortality rates, also sought possible explanations for the effect of proportion Black; as we did, they found an association between proportion Black and the health status of older Whites. The association was significant after control for the dissimilarity index and measures of educational attainment, obesity, cigarette consumption, and pollution. This result suggests that the effect of racial minority concentration on the health of older Whites found in our multilevel analysis may not have been driven by the omission of these particular area-level characteristics.

An additional explanation for the observed association between county-level proportion Black and the health status of White individuals is that of selective migration.[12,28] That is, healthy Whites may migrate from areas with high concentrations of racial minority groups. Our results are generally consistent with this explanation, in that we found a significant positive association between county-level proportion Black and the health status of Whites but no association between proportion Black and the health status of Blacks. However, additional research is required to assess this explanation fully. For example, a study conducted by Le Clere et al.[28] was unsupportive of the role of selective migration, while Fuchs et al.[12] found some support for this hypothesis.

In our study, racial concentration exhibited a significant association with the health status of Whites aged 65 to 74 years only at the county level. This suggests that area characteristics are more powerful determinants of health when they are defined for smaller geographic units, consistent with existing studies involving neighborhood-level measures. However, since our county-level sample excluded individuals in smaller counties, this result could also reflect important sample differences. An inspection of Table 2 suggests that the individuals omitted from the county-level analysis were likely to have lower incomes, less education, and worse health. Observable factors aside, differences in unobserved traits that are correlated with proportion Black will produce biased estimates of the association between racial minority concentration and health.

For example, if a factor that we were unable to control in our model were positively correlated with proportion Black in an individual's area of residence and reduced the individual's probability of poor health, then our estimated association between proportion Black and health status would be understated. One such possibility is quality of health care, which may be higher in urban areas. On the other hand, omitted factors such as crime and pollution may be positively correlated with proportion Black; to the extent that these factors are determinants of health, this would cause our estimates of the effect of proportion Black on individual health status to be overstated. We suggest these possibilities here and leave additional exploration for subsequent research.

The absence of a robust association between proportion Black and individual health status suggests that the observed ecological association between racial minority composition and health status is driven by regional influences, differences in the socioeconomic status of individuals across states and counties, and differential race-specific effects of socioeconomic status on health. In our work, several measures of socioeconomic status had more sizable effects on the health status of Blacks than on the health status of Whites. Increases in household income, median state (or county) income, educational level, and insurance coverage were each associated with larger improvements in the health status of Blacks than in that of Whites.

Our study illustrates that important methodological distinctions between ecological and multilevel analyses can have significant consequences for studying relationships between population factors and health status. In some models, we found that multilevel analyses including individual-level covariates did not reproduce the significant associations between proportion Black and health status observed at the ecological level. Nonetheless, for 2 reasons, our results do not rule out the possibility that aggregate factors play a role in determining health status.

First, an aggregate factor represented by proportion Black—that is, discrimination—may cause a "sorting" of Black individuals to areas with other traits that are detrimental to their health (such as reduced availability of health care). A more complete accounting for this possible sorting process was beyond the scope of our analysis. Additional research that helps to identify and account for the processes that result in higher levels of racial minority concentration is warranted.

Second, continued consideration of the role of aggregate factors in determining health status is supported by our results involving regional fixed effects. In most models of health status reported in this study, regional effects were jointly significant, and their inclusion reduced the magnitude and significance of the proportion Black effect. This suggests that proportion Black is correlated with the unmeasurable effects represented by the region dummies.

Our results underscore the need for additional work in the field of public health that will identify the causal processes frequently represented by aggregate measures such as proportion Black. As noted by other scholars in the field, measures such as proportion Black and segregation are often used as proxies for a number of contextual measures that affect health status at the level of the neighborhood, state, or region.[11,13,27] Direct determinants may include environmental factors, social support networks, crime, lifestyle and behavior choices, and measures of health care access and quality. Additional study is required to identify and to improve the measurement of the underlying processes that explain the pathways from regional and local contexts to improved health. Our research highlights the need for these interim steps as part of a larger process that will ultimately lead to more effective public health policies and interventions that reduce health disparities. ■

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Contributors

J.M. Mellor contributed to the planning of the study, analyzed the data, and wrote the article. J.D. Milyo planned the study, contributed to analysis and interpretation of data, and assisted with the writing of the article. Both authors contributed to the summary of existing literature.

Human Participant Protection

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